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Ethnoveterinary Plants used by Rural People of Dagshai Region in District Solan of Himachal Pradesh, India

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ABSTRACT: The present study was conducted in the Dagshai region of district Solan, located in Himachal Pradesh, to collect and document the traditional ethnoveterinary knowledge utilized by the local communities. A total of 67 veterinary plants belong to 44 families were reported from the study area. The informants were selected through the snowball method, and the documentation involves the use of pre-tested questionnaires, direct interviews and group discussions. A total of 110 informants were selected for traditional information. Most of the plant species reported from the study site belong to the Rosaceae family (6), followed by the Fabaceae and Lamiaceae families (4 each). Maximum plant species collected from study area were trees (45%), followed by herbs (34%) and shrubs (16%). The leaves were the most used plant part for ethnoveterinary practices. The most common livestock diseases reported from the study site were skin infections, gastrointestinal disorders, eye infections and foot and mouth diseases. The plant remedies were used in the form of paste, powder, and extract or decoction. During the present survey, it was noticed that older people have more diverse traditional knowledge of plants used for veterinary purposes as compared to the younger generation. The main aim of the present survey was to collect and document the traditional ethnoveterinary knowledge from the Dagshai region of district Solan, Himachal Pradesh.

Keywords: Ethnoveterinary, Livestock, Traditional Knowledge, Informants.

INTRODUCTION

Nature has been the source of wide range of biodiversity. The plants have been used as therapeutic agents for treating human and livestock diseases since the beginning of human civilization. Medicinal plants have been used for the treatment of both human and animal diseases. About 80% of the world population is dependent on plants for traditional medicine for the prevention and treatment of diseases, involving both humans and animals. Ethnoveterinary practices have gained importance in the past few years due to their high efficacy and fewer side effects (Yadav *et al.,* 2014; Oyda, 2017). Most of the people in developing countries with low incomes are highly dependent on medicinal plants for their animal welfare. Mainly in mountainous and high-elevation areas, cattle are very essential for food, local economies, and social security, and they are often a symbol of stature (Moyo and Swanepoel, 2010; Abbasi *et al.,* 2013). Plants were used to create a variety of modern drugs for the treatment of livestock diseases. Due to the presence of various biologically active components, the plants were used as a source of medicine (Yadav *et al.,* 2014; Prakash *et al.,* 2021). Traditional ethnoveterinary knowledge continues to provide primary methods for

the treatment of diseases and as an alternative source of income for many underprivileged indigenous communities (Thakur and Waske, 2018; Radha *et al.*, 2019, 2021). Most of the people in the developing countries acts as a source of rich and vast indigenous knowledge. The rural communities residing in these areas plays an important in the utilization and conservation of plant resources (Reang *et al.,* 2016). Millions of people around the world have an intimate relationship with their livestock, as they serve as a source of raw material for clothes, cash, food, fertilizers, and also a medium of exchange. Despite the importance of livestock and its economic potential, the veterinary sector has not been much developed and has remained a major factor in the increase in animal disease (Ayehu and Debebe, 2018). Ethnoveterinary medicinal plants were used extensively and effectively for the treatment of diseases in domestic animals. The Indian Himalayan Region is one of the world's largest biodiversity hotspots and accounts for more than 9000 plant species, of which 33% are endemic. It was reported that different plant species were used for veterinary purposes and for animal nourishment since ancient times (Rau, 1974; Myers *et al.*, 2000; Dhar *et al.,* 2002). As rural people around the world have limited access to modern medicine, they mostly depend on traditional medicines for the healthcare and management practices of their livestock. Also, the medicinal drugs obtained from plants were cheaper than western medicines. The tribal and non-tribal communities were highly dependent on forest products for their health and diet and also for the well-being of their livestock. However, the knowledge about these traditions is not adequately documented from various parts of the world, and the information was passed down orally to the next generation, resulting in dilution due to a lack of observation and technical abilities. Ethnoveterinary medicines contribute to the management of diseases related to animals in a cost-effective manner. However, research studies which prove the pharmaceutical efficiency of plants are few (Kannan *et al.,* 2016). This proves that plants serve as a source of potent medicine for curing various diseases of livestock. The traditional ethnoveterinary knowledge acquired by traditional herbal healers and ethnic communities in rural areas is transmitted orally from generation to the next (Phondani *et al.,* 2010). Traditional knowledge of local communities is not well documented. As there is a significant shortage of research in ethnoveterinary, a greater understanding of traditional knowledge leads to its validation, which eventually leads to better animal healthcare and improved living conditions for rural, impoverished people (Lans *et al.,* 2007; Nyamanga *et al.,* 2008; Confessor *et al.,* 2009).

The available information on ethnoveterinary medicine is quite limited in India. The district of Solan in Himachal Pradesh possesses an extremely diverse biodiversity and traditional knowledge. The degradation of plant resources could be a threat to the existence of medicinal plants due to increasing levels of deforestation and overexploitation. The traditional knowledge passed from one generation to the next is also becoming limited or very rare. There is no written evidence for the application of plants to livestock. Thus, indigenous ethnoveterinary knowledge will be lost unless the important medicinal plants from the unexplored regions are conserved, properly documented, and analyzed further (Birhan *et al.,* 2018). However, very little effort has been made to document and analyze the indigenous information about the ethnoveterinary medicinal plants from the Dagshai region of Solan, located in Himachal Pradesh, India. To the best of our knowledge, there has been no previous study or survey conducted for the documentation of medicinal plants used for veterinary purposes and traditional ethnoveterinary knowledge from the Dagshai region of district Solan. Therefore, the present study was conducted to document the ethnoveterinary plants and traditional practices in the Dagshai region, in Himachal Pradesh.

MATERIAL AND METHODS

A. Study area

The present study was conducted in the Dagshai region of district Solan, which is located on a 5,689-foot (1,734-m) high hill in Himachal Pradesh (Sharma and Sood, 2013) (Fig. 1).

The Solan district lies between 30.05°N and 31.15° N, 76.42° to 77.20°E in the humid-subtropical zone and the humid-sub temperate zone of the Himalayas in Himachal Pradesh. The boundary of Solan is surrounded by Punjab and Haryana. The district Solan mainly consists of temperate forests (ban, deodar, oak etc.), subtropical broadleaved forests, pine forests and scrubs (Singh, 2015). In the months of January and February, snow can be seen in the higher altitudes of the Solan district. The climate ranges from subtropical to warm temperatures. Due to variations in the climatic conditions, the area of Solan has diverse biodiversity and medicinal plants in general (Sharma and Sood, 2013). The main goal of the present study was to collect and document ethnoveterinary plants from the Dagshai region of district Solan in Himachal Pradesh.

B. Data collection

The field survey was done in the Dagshai region of the district of Solan, located in Himachal Pradesh in the year 2021. The field visits were done to collect the indigenous ethnoveterinary information from the study site. A total of 110 informants were selected for the collection of information through the snowball method. The data was collected through open conversations and interviews with local informants ranging in age from 25 to 70 years old. It was observed that most of the informants were aged 55 to 70 years. The

ethnoveterinary data was collected using a pre-tested questionnaire. The traditional uses of ethnoveterinary plant resources were learned with the help of a questionnaire and through participatory techniques.

The local people of the study area helped a lot with collecting and identifying the plant species. They served as guides in the field survey of ethnoveterinary plants. They confirmed these plants' local identity. Each informant was separately interviewed in their local language. The ethnoveterinary significance of the collected plants includes information about their common names, parts used to treat different ailments, and detailed discussions with local people and traditional healers.

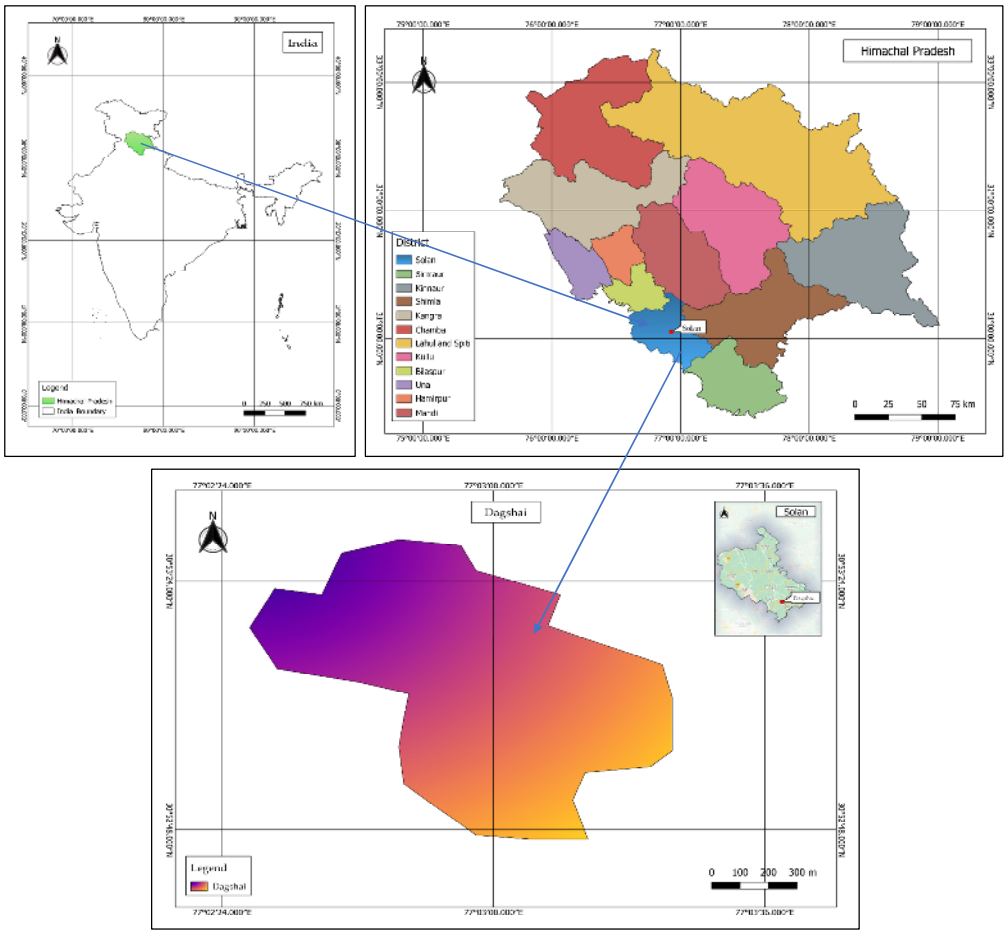


Fig. 1. Google map of India showing study site.

QUESTIONNAIRE FOR CONDUCTING THE ETHNOVETERINARY STUDY

A) DEMOGRAPHIC DATA

- Name of Tehsil.....
- Name of Village.....
- Rural .....
- Sr. No…….....
- Age…….
- Education…….

B) ETHNOVETERINARY PLANT USES

- Plant (Local / Vernacular name)
- Plant identified as..... (Botanical name)
- Habit of the plant (Trees/Shrubs/Herbs/Climbers/Grasses/Other)
- Part(s) of plant used.....
- Nature of ailment treated.....
- Route of administration (a) Oral (b) Topical.
- Response of the informant(s).
- Effective/Good..... (b) Fair..... (c) Poor.....

(C) INFORMANTS DECLARATION

We, the above-mentioned, have voluntarily agreed to participate in this study with our full consent, and we declare that the information and knowledge given in the interview and discussion is correct and complete.

C. Data analysis

Ethnoveterinary data were gathered from 110 informants (62 males and 48 females) from the Dagshai region of district Solan. The ethnoveterinary data was

analyzed through used value. Apart from the collection of information from the study site, the ethnoveterinary data was analyzed using a statistical quantitative method called use Value. The use value is an ethnobotanical key that has been used to calculate the relative value of use analyzed species (Phillips and Gentry, 1993). The formula by which the use value can be calculated is as follows:

$$UV = \Sigma Ui / n$$

Where Ui is the number of usage reports cited by each informant for a given plant species, and n is the total number of informants selected for interview. It is important to find which plants are most useful to specific inhabitants, estimate possible medicinal plant uses, and determine community awareness (Phillips and Gentry, 1993; *et al.*,2006; Yabesh *et al.*, 2014). It has been mentioned that use value places more significance to plants which have various uses, even if these species are not well identified (Albuquerque *et al.*, 2006; Silva *et al.*, 2006).A high use value indicates that the plant is important, while a low or smaller value indicates that the plant is rarely used or recorded. There is no indication in the use value whether the plant is used for one or more purposes (Musa *et al*., 2011).

RESULTS

A. Demography of informants

The ethnoveterinary data from the study site was gathered through open discussions and direct interviews with the informants selected through snowball method. The informants were divided into five groups on the basis of their age. The highest number of informants belong to the age group of 61 to 70 (30), subsequently followed by 51-60 (28), 41-50 (24), 31-40 (18) and 25-30 years old (10) (Table 1). The current survey of ethnoveterinary plants samples was revised based on the informant's responses, designed and pre-tested with the informants. To document traditional knowledge on ethnoveterinary plants, total 110 informants were selected. The information was gathered through pre-tested questionnaire, direct interviews and group discussions. The goal of the present study was to analyze and document important medicinal plants used in veterinary field traditionally.

Table 1: Demography of informants.

Sr. No.	Age group	Number of informants				
1	25-30	10	(7 Male, 3 Females)			
2	31-40	18	(10 Male, 8 Females)			
3	41-50	24	(13 Male, 11 Females)			
4	51-60	28	(16 Male, 12 Females)			
5	61-70	30	(16 Male, 14 Females)			
Literacy among informants		Age groups				
		25-30	31-40	41-50	51-60	61-70
1	Never attended school	0	0	4	6	14
2	Attended school up to primary level (1-5 class)	0	5	6	8	16
3	Attended school up to middle level (6-8)	0	6	7	7	0
4	Attended school up to metric level (9-10 class)	10	7	7	7	0

B. Ethnoveterinary plant

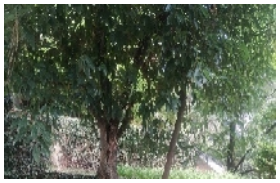
The present study revealed that the people of Dagshai region, in general Solan have very rich traditional knowledge related to ethnoveterinary medicinal plants. During the survey and conversation with local people of the Solan, it was observed that they learned traditional ethnoveterinary plant knowledge from their elders or through experience passed from generation to generations. A total of 67 ethnoveterinary plants belongs from 44 different families were reported in the Dagshai region of district Solan. The medicinal plants collected from study site belongs to 44 same or different families. The Rosaceae family (6 species) has reported highest number of medicinal plants from the study site, followed by Fabaceae and Lamiaceae family (4 species each) (Fig. 2). Most of the plant species collected from the study site were trees (45%) followed by herbs (34%), shrubs (16%), climbers (2%), ferns (1%) and grasses (1%) are the largest in the number of the known species 45%, followed by herbs 35%, shrubs 16%, climbers 2%, ferns 1% and grasses 1% (Fig. 3). The data on medicinal plants from study site was arranged in a systematic manner in tabular form that include scientific name, common name, family, parts used, preparation and method of administration of herbal formulation (Table 2).

Table 2: Ethnoveterinary plants collected from study site.

Sr. No.	Scientific Name	Plant pictures	Family	Common name	Habit	Voucher no.	Part used	Route used	Ailments treated	Use Value
1.	*Acorus calamus* L.		Acoraceae	Barya	Herb	SUBMS/BOT-4579	Rhizome	Oral	Powder of rhizome with wheat flour is used to treat the gastrointestinal problems (54).	0.49
2.	*Acacia catechu* (L.f.) Willd.		Fabaceae	Khair	Tree	SUBMS/BOT-4580	Bark	Oral	Extract of bark is used to treat the foot infection (68).	0.61
3.	*Achyranthes aspera* L.		Amaranthaceae	Puthkanda	Herb	SUBMS/BOT-4581	Leaves	Topical	Powdered leaves are used to treat skin infections (78).	0.70
4.	*Allium tuberosum* Rottler ex Spreng.		Amaryllidaceae	Jungalilassan	Herb	SUBMS/BOT-4582	Buds	Oral	Buds are used to cure mouth infections (60).	0.54
5.	*Aloe barbadensis* Mill.		Asphodelaceae	Dwarya	Herb	SUBMS/BOT-4583	Leaves	Oral	Extract of leaves is used as appetizer for livestock (56).	0.50

6.	*Asparagus racemosus* Willd.		Asparagaceae	Shatavari	Herb	SUBMS/BOT-4584	Roots	Oral	Powder of roots increase the milk production in cattle (81).	0.73
7.	*Bambusa vulgaris* Schrad.		Poaceae	Benjh	Tree	SUBMS/BOT-4585	Leaves	Oral	Leaves are given to cows for easier removal of placenta after delivery (51).	0.46
8.	*Bauhinia variegate* L.		Fabaceae	Kachnar, karyala	Tree	SUBMS/BOT-4586	Leaves	Oral	Leaves are used as fodder to purify the blood and to prevent heat stress (59).	0.53
9.	*Bergenia ciliata* (Haw.) Sternb.		Saxifragaceae	Pashan-bhed	Herb	SUBMS/BOT-4587	Leaves	Oral	Extract of leaves are used to treat the gastrointestinal problems (67).	0.60
10.	*Bergenia ligulata* Wall		Saxifragaceae	Dakachru	Herb	SUBMS/BOT-4588	Leaves	Oral	Leaves are used to treat the retention of urine (59).	0.53
11.	*Borassus flabellifer* L.		Areaceae	Taal	Shrub	SUBMS/BOT-4589	Stem	Tropical	Stem juice is used to treat eye infections (49).	0.44

12.	*Bougainvillea spectabilis* Willd.		Nytaginaceae	Booganbel	Shrub	SUBMS/BOT-4590	Leaves	Oral	Extract of leaves are used to cure severe skin infections (51).	0.46
13.	*Buxus microphylla* Siebold & Zucc.		Buxaceae	-	Shrub	SUBMS/BOT-4591	Wood	Oral	Extract of wood is used as blood detoxifying agent (52).	0.47
14.	*Cannabis sativa* L.		Cannabaceae	Bhang	Herb	SUBMS/BOT-4592	Leaves	Topical	Leaf extract is applied over animal body to prevent from lice and ticks (85).	0.77
15.	*Carissa opaca* Stapf ex Haines		Apocynaceae	Garna	Shrub	SUBMS/BOT-4593	Leaves	Topical	Leaf extract is used to treat heat stroke in cattle (57).	0.51
16.	*Catharanthus roseus* (L.) G.Don		Apocynaceae	Sadabahar	Herb	SUBMS/BOT-4594	Flower	Topical	Extract of flower is used for wound healing (61).	0.55
17.	*Cedrus deodara* (Roxb.ex D.Don) G.Don		Pinaceae	Deodar	Tree	SUBMS/BOT-4595	Bark	Topical	Bark oil is applied externally on the broken horns (69).	0.62

18.	*Centella asiatica* (L.) Urb.		Apiaceae	Brahmi	Herb	SUBMS/BOT-4596	Leaves	Topical	Leaf extract is used to treat skin diseases (53).	0.48
19.	*Cinnamomum camphora* (L.) J. Presl		Lauraceae	Kapur	Tree	SUBMS/BOT-4597	Bark, Leaves	Oral, Topical	Extract of bark and leaves are applied to cure inflammation (48).	0.43
20.	*Cissampelos pareira* L.		Menispermeaceae	Bhtindu	Climber	SUBMS/BOT-4598	Roots, Leaves	Oral	Infusion of roots and leaves are used to treat gastrointestinal problems (41).	0.37
21.	*Citrus limon* (L.) Osbeck		Rutaceae	Nimbu	Tree	SUBMS/BOT-4599	Fruits	Oral	Extract of fruits is used to lower the body temperature (56).	0.50
22.	*Curcuma longa* L.		Zingiberaceae	Haldi	Herb	SUBMS/BOT-4600	Rhizome	Topical	Powder of dried rhizome applied for wounds healing and laxity of tooth (80).	0.72
23.	*Cymbopogon citratus* (DC.) Stapf		Poaceae	-	Grass	SUBMS/BOT-4601	Leaves	Oral	Extract of leaves are used to treat diarrhea and tick infestation in livestock (53).	0.48

24.	*Datura fastuosa* L.		Solanaceae	Dhatura	Shrub	SUBMS/BOT-4602	Leaves	Topical	Leaf extract is applied to cure inflammation of mammary glands (60).	0.54
25.	*Desmostachya bipinnata* (L.) Stapf		Poaceae	Dab	Herb	SUBMS/BOT-4603	Roots	Oral	Extract of roots are used to cure prolapse of uterus (56).	0.50
26.	*Elaeocarpus ganitrus* Roxb. ex G.Don		Elaeocarpaceae	Rudraksha	Tree	SUBMS/BOT-4604	Leaves	Oral	Extract of leaves are used to treat cough and hepatic diseases (46).	0.41
27.	*Eucalyptus citriodora* Hook.		Myrtaceae	Safeda	Tree	SUBMS/BOT-4605	Leaves	Topical	Leaves are used to heal wounds (52).	0.47
28.	*Ficus benghalensis* L.		Moraceae	Bargad	Tree	SUBMS/BOT-4606	Leaves	Topical	Extract of leaves are applied on wound caused by maggots (65).	0.59
29.	*Ficus palmate* Forssk.		Moraceae	Fagura	Tree	SUBMS/BOT-4607	Fruits	Oral	Fruits are used to treat diarrhea (64).	0.58

30.	*Ficus religiosa* L.		Moraceae	Pipal	Tree	SUBMS/BOT-4608	Leaves, Bark	Oral	Extract of leaves is used to treat nose and throat infection. Bark is used for removal of retained placenta (65).	0.59
31.	*Grewiaoptiva* J.R. Drumm. ex Burret		Malvaceae	Bihul	Tree	SUBMS/BOT-4609	Bark	Topical	Paste of bark is used as a plaster and fresh bark as a bandage on cattle fracture (71).	0.64
32.	*Hibiscus rosa-sinensis*L.		Malvaceae	Gurhal	Tree	SUBMS/BOT-4610	Leaves, Flowers.	Oral	Infusion of flower and leaves are used to treat constipation and dysentery (53).	0.48
33.	*Hypodematium crenatum* (Forssk.) Kuhn & Decken		Hypodemateaceae	Jadibuti	Fern	SUBMS/BOT-4611	Leaves	Topical	Extract of leaves is used to cure inflammations and healing wounds (67).	0.60
34.	*Juglans regia* L.		Juglandaceae	Akhrot	Tree	SUBMS/BOT-4612	Leaves	Topical.	Leaf extract is used to treat the skin diseases (63).	0.57
35.	*Justicia adhatoda* L.		Acanthaceae	Basuti	Herb	SUBMS/BOT-4613	Leaves	Oral	Leaves are used to treat the digestive problems (60).	0.54

36.	*Koelreuteria paniculata* Laxm.		Spindaceae	-	Tree	SUBMS/BOT-4614	Flowers	Oral	Flower extract is used to treat eye infections (51).	0.46
37.	*Leucaena leucocephala* (Lam.) de Wit		Fabaceae	Lasuni	Tree	SUBMS/BOT-4615	Leaves	Topical	Leaf extract is used to cure wounds (49).	0..44
38.	*Ligustrum japonicum* Thunb.		Oleaceae	-	Tree	SUBMS/BOT-4616	Leaves	Topical	Leaf extract is used to treat eye and skin infections (43).	0.39
39.	*Machilus gamblei* King ex Hook.f.		Lauraceae	Bhjhol	Tree	SUBMS/BOT-4617	Leaves	Topical	Leaf extract is used to cure skin infections (45).	0.40
40.	*Melia azedarach* L.		Meliaceae	Bakain	Tree	SUBMS/BOT-4618	Leaves	Oral	Leaf extract is used to treat mouth infections (46).	0.41
41.	*Mentha arvensis* L.		Lamiaceae	Pudina	Herb	SUBMS/BOT-4619	Leaves	Topical	Leaf extract is applied on skin to protect against external parasites (66).	0.6

42.	*Murraya koenigii* (L.) Spreng.		Rutaceae	Gandhela	Tree	SUBMS/BOT-4620	Leaves	Oral	Leaves are used to cure dysentery (61).	0.55
43.	*Myrica esculenta* Buch-Ham. ex D.Don		Myricaceae	Kaphal	Tree	SUBMS/BOT-4621	Bark	Topical	Bark is boiled with water and used externally for treating wounds (59).	0.53
44.	*Ocimum sanctum* L.		Lamiaceae	Tulsi	Herb	SUBMS/BOT-4622	Leaves	Topical	Extract of leaves are used for the treatment of digestive disorders (72).	0.65
45.	*Origanum vulgare* L.		Lamiaceae	-	Herb	SUBMS/BOT-4623	Leaves, Flowers	Oral, Topical	Leaf paste is used to treat skin diseases. Flowers are used to cure inflammation (57).	0.51
46.	*Oxalis corniculate* L.		Oxalidaceae	Amrul	Herb	SUBMS/BOT-4624	Leaves	Topical	Juice of leaves is used to cure eye infections (54).	0.49
47.	*Pelargonium graveolents* L'Hér.		Geraniaceae	-	Shrub	SUBMS/BOT-4625	Leaves	Oral	Extract of leaves are used to cure intestinal disorders (52).	0.47

48.	*Phyllanthus emblica* L.		Phyllanthaceae	Amla	Tree	SUBMS/BOT-4626	Bark	Topical	Extract of bark is applied for rapid wound healing (68).	0.61
49.	*Pinus roxburghii* Sarg.		Pinaceae	Cheer	Tree	SUBMS/BOT-4627	Bark	Topical	Resin is used to join the broken parts of horns (52).	0.47
50.	*Piper longum* L.		Piperaceae	Mug pippali	Herb	SUBMS/BOT-4628	Fruit	Oral	Fruit extract is used to cure internal injury, wounds and bruises (59).	0.53
51.	*Prunus avium* (L.) L.		Rosaceae	Kaphal	Tree	SUBMS/BOT-4629	Fruit	Oral	Fruit extract is used to treat mouth blisters and external injuries (60).	0.54
52.	*Prunus persica* (L.) Batsch		Rosaceae	Aru	Tree	SUBMS/BOT-4630	Leaves	Topical	Leaf paste is applied externally to cure wounds (54).	0.49

53.	*Prunus serotina* Ehrh.		Rosaceae	-	Tree	SUBMS/BOT-4631	Fruits	Oral	Extract of fruit is used to reduce the uric level (41).	0.37
54.	*Psidium guajava* L.		Myrtaceae	Amrood	Tree	SUBMS/BOT-4632	Leaves	Topical	Leaf extract is used to cure cuts and wounds (49).	0.44
55.	*Punica granatum* L.		Lythraceae	Anar	Shrub	SUBMS/BOT-4633	Leaves	Oral	Decoction of leaves is used to expel intestinal worms in cattle (47).	0.42
56.	*Pyrus communis* L.		Rosaceae	Nashpati	Tree	SUBMS/BOT-4634	Leaves	Oral	Leaves are used to cure digestion problems and diarrhea (54).	0.49
57.	*Pyrus pashia* Buch.-Ham. ex D.Don		Rosaceae	Kainth	Tree	SUBMS/BOT-4635	Fruit	Oral	Juice of ripened fruit is used to treat eye infections (51).	0.46
58.	*Rubus ellipticus* Sm.		Rosaceae	Aakhae	Shrub	SUBMS/BOT-4636	Fruits	Oral	Extract of fruit is used to treat cough, fever and sore throat (53).	4.81

59.	*Rumex hastatus* D.Don		Polygonaceae	Khatti-buti	Shrub	SUBMS/BOT-4637	Root	Oral	Root extract is used to cure skin infections and to stop bleeding (55).	0.5
60.	*Salix babylonica* L.		Salicaceae	-	Tree	SUBMS/BOT-4638	Leaves, Bark	Oral, Topical	Extract of bark is used to treat the fever and leaf extract is applied to inflammations (49).	0.44
61.	*Tagetes erecta* L.		Asteraceae	Genda	Herb	SUBMS/BOT-4639	Leaves	Topical	Juice of leaves is applied externally on the broken horns (67).	0.60
62.	*Thalictrum foliolosum* DC.		Ranunculaceae	Chirata	Herb	SUBMS/BOT-4640	Flowers	Oral	Flower extract is used to treat the jaundice, and snakebites (49).	0.44
63.	*Trifolium repens* L.		Fabaceae	-	Herb	SUBMS/BOT-4641	Leaves	Oral	Leaves are used to prevent the milk deficiency in goats and cattle (51).	0.46
64.	*Viola odorata* L.		Violaceae	Banafsha	Herb	SUBMS/BOT-4642	Leaves	Oral	Leaves are used to treat insomnia, cough and fever (59).	0.53

65.	*Vitex negundo* L.		Lamiaceae	Bana	Shrub	SUBMS/BOT-4643	Leaves	Topical	Extract of leaf applied to treat the wounds (70).	0.63
66.	*Withania somnifera* (L.) Dunal		Solanaceae	Ashwagandha	Herb	SUBMS/BOT-4644	Leaves	Oral	Leaf extract is used to treat gastrointestinal problems (42).	0.38
67.	*Ziziphus nummularia* (Burm.f.) Wight &Arn.		Rhamnaceae	Ber	Shrub	SUBMS/BOT-4645	Leaves	Topical	Leaves are used to cure cuts and wounds (72).	0.65

The importance of the ethnomedicinal plants use for the treatment of animal diseases was analyzed by using use value. The highest use value was calculated for *Cannabis sativa* (0.77), *Asparagus racemosus* (0.73), *Curcuma longa* (0.72), *Ziziphus nummularia* (0.65), *Ocimum sanctum* (0.65) and *Grewia optiva* (0.64). The most commonly reported diseases of livestock from study site were skin infections, diarrhea, inflammations, gastrointestinal problems, infestation of worms in intestine, foot and mouth infections and ticks and fleas (external parasites). The medicinal plants reported from the study site mostly include trees (45%), herbs (35%) and shrubs (16%) (Fig. 2). Highest number of plant species were reported from Rosaceae family (Fig. 3) are used to cure digestion problems, cough, wounds and diarrhea. It was also observed that some of the medicinal plants such as *Cannabis sativa, Punica granatum, Datura innoxia, Rubus ellipticus, Vitex negundo, Pyrus pashia, Pyrus communis, Ocimum sanctum, Murraya koengii, Pinus ruxburghii, Ficus palmata, Justice adatodha, Grewia optiva, Aloe barbadenesis, Accacia catechu, Desmostachya bipinnata, Leucaena leucocephala, Carissa opaca* and *Prunus persica* were mostly utilized in the study area.

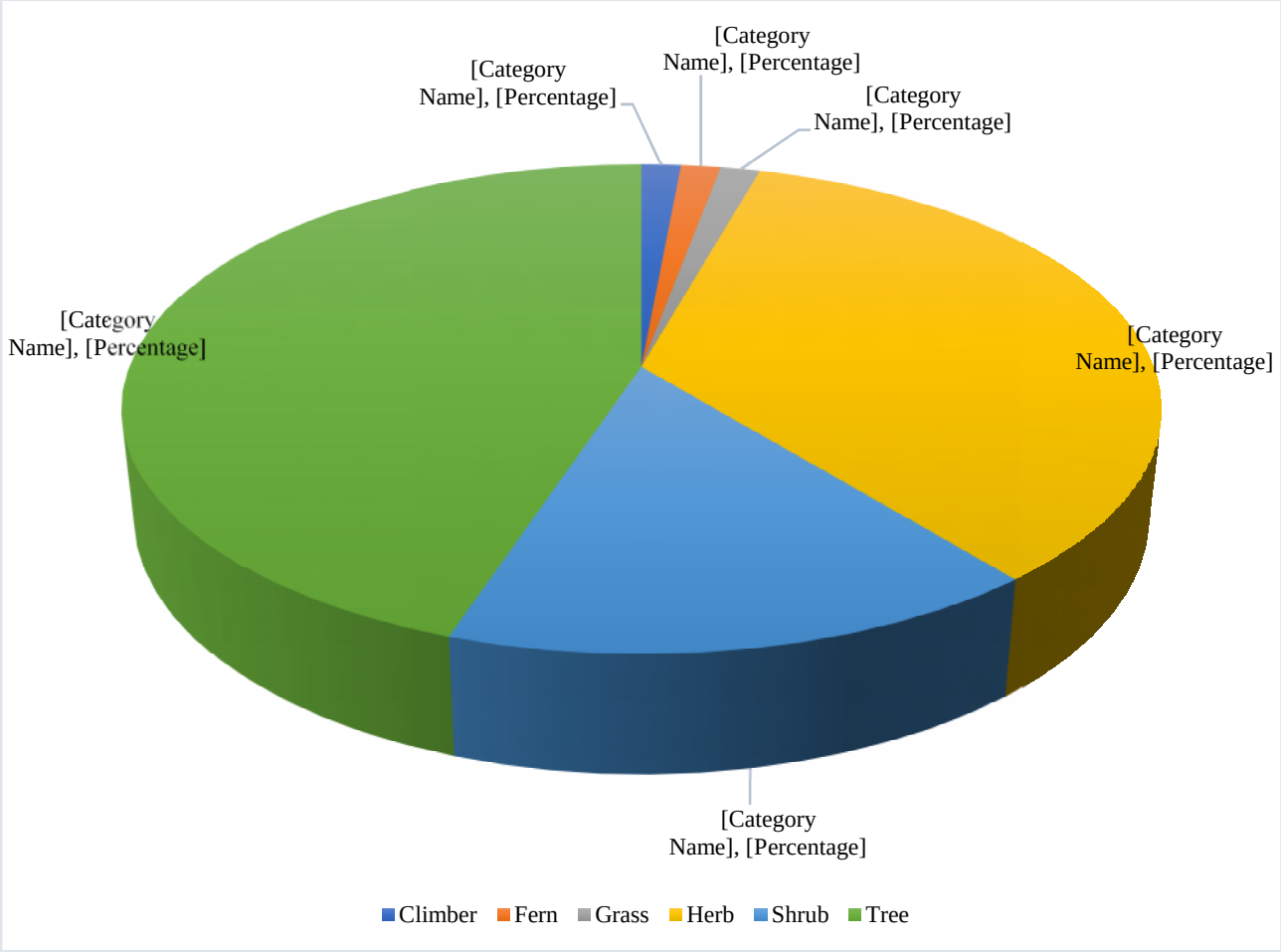


Fig. 2. Representation of growth forms of plant species collected from study area.

The leaves, fruits and bark were most commonly used plant parts at the study site for ethnoveterinary purpose (Fig. 4). The leaves are the most used plant parts of these wild medicinal plants. The leaves were used by local people to cure a variety of ailments found in the livestock including skin and eye infections are *Oxalis corniculate, Origanum vulgare, Ocimum sanctum, Prunus persica, Mentha arvensis, Machillus gamblei, Ligustrum japonicum, Juglans regia, Centella asiatica, Achyranthus aspers.* Some of plants such as *Withania sominifera, Viola odorata, Pelaronium graveolens, Origanum vulgare, Murraya koenigii, Ocimum sanctum, Elaeocarpus ganitrus, Aspargus racemosus* were suggested by the local informants for the treatment of diarrhea, dysentery, cough, fever, gastrointestinal problems, constipation, flow of milk secretion and inflammations.

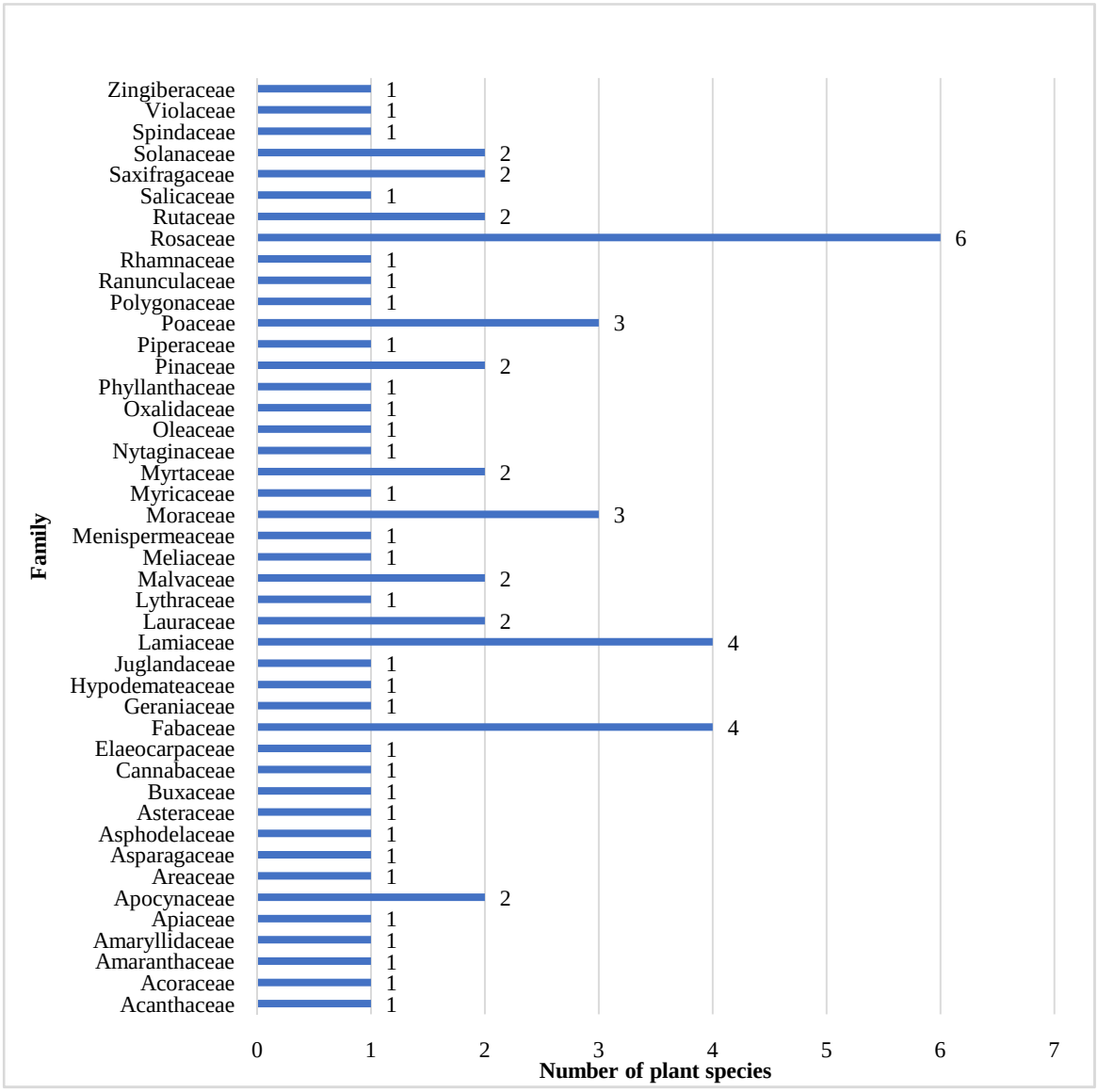


Fig. 3. Representation of growth forms of plant species collected from study site.

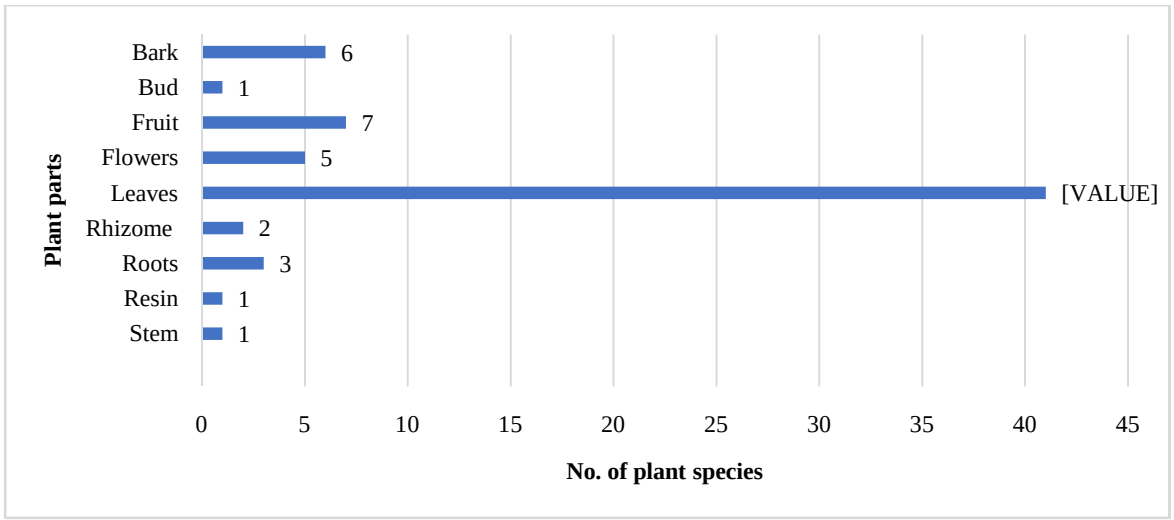


Fig. 4. Representation of number of parts of plant used by informants for ethnoveterinary purpose at study site.

DISCUSSION

Plants are essential for human health as well as animals because they provide a wide range of traditional and modern remedies and methods in healthcare. The medicinal properties of the plants are due to the presence of active metabolites or compounds which are responsible for certain activities, help in the prevention and treatment of diseases (Rau, 1974; Kumar *et al.,* 2021a, 2021b; Mekhemar *et al.,* 2021; Radha *et al.,* 2021). Because of the lack of proper facilities such as primary health care clinics and hospitals in their area, the local people were relying depends on the plants to cure and prevent various health and veterinary problems. They were highly dependent on the curative power of the medicinal plants for veterinary purposes.

The present study has documented the ethnoveterinary plants from the Dagshai region located in Solan of Himachal Pradesh. A total of 67 medicinal plants belonging to 44 families were collected from study site. At the study site, 5 species were used for intestinal disorders or digestive system related problems. Most used plants for this purpose are *Acorus calamus, Bergenia ciliata, Cissampelos pareira, Withania somnifera* and *Pelargonium graveolens.* A total of 14 plants were used for wound healing includes *Catharanthus roseus, Ziziphus nummularia, Vitex negundo, Psidium guajava, Prunus persica, Piper longum, Phyllanthus emblica, Myrica esculenta, Curcuma longa, Catharanthus roseus, Leucaena leucocephala, Eucalyptus citriodora, Ficus benghalensis* and *Hypodematium crenatum.* For the removal of placenta after delivery in cattle *Bambusa vulgaris and Ficus religiosa* plants were used.

Diseases such as mouth blisters, skin infections, infestation by external and internal parasitic worms, foot and mouth diseases were also reported from the study area and cured with the help of medicinal plants collected from the Dagshai region. Some of the plants reported in the present study were also documented in other studies conducted in nearby adjoining areas (Birhan *et al.,* 2018; Kumar and Chander 2018; Puri and Saha, 2020). Most of the times freshly collected plant part or plant are used for the treatment of diseases. The most commonly used parts were leaves followed by bark and fruits (Fig. 4). Generally, plants were used individually and sometimes in combination with two or three more plant species to increase the effectiveness of herbal drug to treat different type of diseases. The plant species such as *Ziziphus nummularia, Ocimum sanctum, Curcuma longa, Cannabis sativa, Grewia optiva* and *Asparagus racemosus,* were most commonly used plant species by the local residents of the study site. The plants are used in the form of paste, decoction, powder, extract or in infusion with other plants extract.

About 80% of informants were enriched their information on indigenous traditional drugs from their grandparents and parents and sometimes from local practitioners and traditional healers. From the present study, it has been noticed that older people or informants selected for interview have rich traditional ethnoveterinary knowledge as compared to younger people or youth of present era (Yadav *et al.,* 2010).

The traditional knowledge on medicinal plants is at the verge of extinction because of rapid changes in cultural diversity and modern culture all over the world (Kubkomawa *et al.,* 2013). Some plant species of medicinal importance were at the threat of extinction due to destructive harvesting and results in the loss of local biodiversity. However, there is need to spread awareness among the local peoples toward conservation and sustainable utilization of these medicinal plants. The purpose of this study was to document and assess traditional ethnoveterinary plant knowledge, and also compare knowledge and explore where the research efforts are focused, in order to gain a sense of current research needs and future research opportunities in the region.

The use of medicinal plants for the treatment of diseases in livestock has improved their health and productivity that ultimately results in economic growth among local people and farmers. The documentation of traditional ethnoveterinary knowledge leads to the development and promotion of its use may help in the improvement of sociocultural status of local communities. The analyzes and documentation of indigenous knowledge aid its use in various fields related to research such as phytochemistry, toxicology, pharmacology, pharmacognosy and veterinary science.

Scientists have realized that there is need to find alternatives that can accelerate the medicinal approach which leads to the improvement, development and productivity of domestic animals (Abebe *et al.,* 2003). Formal ethnoveterinary medicine research will undoubtedly support ethnoveterinary assertions about the efficacy of ethnoveterinary therapies (Yadav *et al.,* 2014).

The findings of the presents paper are very primary or raw, needs further authentication of medicinal plants application for animal husbandry. The pharmacological investigation of medicinal plants collected from study site will define a relationship of traditional ethnoveterinary knowledge and modern pharmaceuticals. The documentation of indigenous ethnoveterinary knowledge will not only helps in the development of useful concepts in pharmacology but also encourage the people about the conservation and maintenance of biodiversity, in general medicinal plants. According to various research, the youth of today are less interested in ancient medical systems of treatment (Kapoor, 2017). They know very little about the medicinal plants found in their surroundings. There are only few older people were left which are passing their knowledge to the next generation. The purpose of

this study was to document and assess traditional ethnoveterinary plant knowledge, and also compare knowledge and explore where the research efforts are focused, in order to gain a sense of current research needs and future research opportunities in the region.

CONCLUSION

Without any proper documentation the traditional knowledge about the use of medicinal plants is passed orally from one generation to the next generation all over the world. And due the modernization, the traditional knowledge on the healing properties of the medicinal plants is decreases day by day. The rural people of Dagshai region in district Solan of Himachal Pradesh in India used ethnomedicinal plants to treat their livestock diseases. A total of 67 plant species were discovered and counted during the survey in the Dagshai region of the district Solan. The highest number of species belongs to the families Rosaceae, Fabaceae, Lamiaceae, Poaceae, Solanaceae, and Moraceae. A wide range of diseases of animals ranging from cough and cold to diarrhea and cuts and wounds to snakebites, eye diseases to gastrointestinal diseases and are treated by the traditional healers of study area with the help of these local plant remedies. Some of these plants are also utilized by livestock owners in ethno-veterinarian techniques to treat animal ailments such as constipation, foot and mouth diseases, dysentery, and diarrhea, and others. The male informants somewhat at study site have better traditional knowledge than female informants. It was reported by most of the informants at the study site that youth of present generation was not much interested in traditional knowledge because of social, cultural, and digital transformation. Due to this the traditional knowledge and skills which passed from generation to generation orally is decreasing day by day. So, there is an urgent need to document and protect medicinal plants used for both human and cattle diseases in rural parts of Solan and from other parts of the world.

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